Tiny Titans: Utilizing Bacteria-produced Nanoparticle in Water Purification System

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The global water crisis affects over 2 billion people, with contaminated water sources leading to waterborne diseases and the growing threat of antimicrobial resistance (AMR). This challenge is particularly severe in rural and disaster-stricken areas, where access to clean water is limited. Addressing this issue requires sustainable solutions capable of removing a wide range of contaminants efficiently. This study investigates the potential of biologically synthesized TiO2 and Ag0 nanoparticles for water purification. TiO2 is known for its photocatalytic ability to degrade organic pollutants under ultraviolet (UV) light, while Ag0 exhibits strong antimicrobial properties against waterborne pathogens. Bio-synthesis was selected for nanoparticle production to reduce reliance on toxic chemicals and high energy inputs, making the process more environmentally friendly and cost-effective compared to conventional methods. The nanoparticles are integrated into a portable water purification system, designed to be efficient, low-cost, and easy to maintain for use in remote areas. This approach aims to provide a scalable and practical solution for improving access to clean drinking water. The successful demonstration of these nanoparticles' ability to remove contaminants highlights their potential for real-world applications. This research aligns with United Nations Sustainable Development Goal 6 (SDG 6), which calls for universal access to safe and affordable water. By combining innovative nanoparticle technologies with sustainable production methods, this study contributes to global efforts to mitigate the water crisis while advancing environmental sustainability

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